

CLAIMS

1. An injection catheter comprising:

an elongated catheter body having at least one lumen extending longitudinally
5 therethrough;

a needle control handle at the proximal end of the catheter body;

a needle electrode assembly extending through the catheter body and needle control
handle and having a proximal end attached to the needle control handle and a distal end within
the distal end of the catheter body; and

10 a mapping assembly, having proximal and distal ends, mounted at the distal end of the
catheter body and comprising at least two flexible spines, each spine having a proximal end
attached at the distal end of the catheter body and a free distal end, wherein each spine carries at
least one electrode;

wherein the distal end of the needle electrode assembly is extendable past the proximal
15 end of the mapping assembly upon manipulation of the needle control handle.

2. The catheter of claim 1, wherein each spine comprises a non-conductive covering
having a support arm that has shape memory disposed therein.

20 3. The catheter of claim 2, wherein each support arm comprises Nitinol.

4. The catheter of claim 1, wherein the mapping assembly is moveable between an
expanded arrangement, in which each spine extends radially outward from the catheter body, and
a collapsed arrangement, in which each spine is disposed generally along a longitudinal axis of
25 the catheter body.

5. The catheter of claim 4, wherein, when the mapping assembly is in its expanded
arrangement, each spine extends radially outwardly from the catheter body and forms an arced
shape.

6. The catheter of claim 1, wherein the mapping assembly comprises at least five spines.

7. The catheter of claim 1, further comprising an electrode lead wire having a first
5 end electrically connected to the needle electrode assembly and a second end electrically connected to a source of ablation energy.

8. The catheter of claim 1, wherein the needle electrode assembly comprises a distal
10 tubing having proximal and distal ends and comprising an electrically conductive material and a proximal tubing comprising a material more flexible than the distal tubing and having a distal end attached, directly or indirectly, to the proximal end of the distal tubing.

9. The catheter of claim 8, wherein the distal tubing comprises metal and the proximal tubing comprises plastic.

15

10. The catheter of claim 8, wherein the distal tubing comprises Nitinol or stainless steel.

11. The catheter of claim 8, wherein the proximal tubing comprises polyimide or
20 PEEK.

12. The catheter of claim 8, wherein the distal end of the distal tubing forms a beveled edge.

13. The catheter of claim 8, wherein the needle electrode assembly further comprises
25 an intermediate tubing joining the proximal and distal tubings.

14. The catheter of claim 8, wherein the needle electrode assembly further comprises
30 an outer plastic tubing fixedly attached, directly or indirectly, to the proximal and distal tubings so that the outer plastic tubing is moveable with the proximal and distal tubings relative to the catheter body.

15. The catheter of claim 14, wherein the electrode lead wire is fixedly attached to the distal tubing and extends within the outer plastic tubing and outside the proximal tubing.

5 16. The catheter of claim 8, further comprising a temperature sensor mounted within the distal tubing.

17. The catheter of claim 1, further comprising a temperature sensor mounted in or around the needle electrode assembly.

10